

**Remarks:**

Applicants appreciatively acknowledge the Examiner's confirmation of receipt of Applicants' claim for priority and certified priority document under 35 U.S.C. § 119(a)-(d).

Reconsideration of the application is respectfully requested.

Claims 1 - 13 are presently pending in the application.

Claims 1, 3, 4, 6, 8, 10, 11 and 13 have been amended.

Applicants gratefully acknowledge claims 2, 3, 5 - 7, 9, 10, 12 and 13 have been indicated as being allowable if rewritten to include all the limitations of the claims from which those claims depend. Claims 4 and 11 have been indicated as being allowable if rewritten to overcome the rejections under 35 U.S.C. § 112, second paragraph, and also to include the limitations of any claims from which those claims depend.

The specification of the instant application has been amended to replace the term "output state", with the term "precursor state". The specification of the instant application supports the use of "precursor state" where the term "output state" had been used. For example, on page 31 of the instant application, line 17 - page 32, line 5, the terms "precursor state" and "output state" were used interchangeably, as follows:

" $a_{n-1}^{(i)}$  denoting the replacement symbol assigned to the  $i$ th transmitter state, and  $d_n^{(i \rightarrow q)}$  denoting that input data symbol which in relation to the time step  $n$  leads from the precursor state with index  $i$  into the target state with index  $q$ . Since the state description in the case of the MLSE according to the invention no longer is performed with the aid of the replacement symbols,  $a_{n-1}^{(i)}$  is unknown a priori in the receiver (in the case of the previously described conventional VA,  $a_{n-1}^{(i)} = z_n^{0,(i)}$  would be prescribed by the output state considered)." (emphasis added by Applicants)

Further, page 26 of the instant application, line 14 - page 29, line 12, also supports the use of "precursor state" in place of "output state". In order to provide even greater clarity, Applicants have amended the instant application to replace the term "output state", as used therein to refer to the precursor state, with the actual term "precursor state". Claims 1, 3, 4, 6, 8, 10, 11 and 13 have been correspondingly amended.

In item 4 of the above-identified Office Action, claims 4 and 11 were rejected under 35 U.S.C. § 112, second paragraph for reciting "the receiver" without allegedly providing proper antecedent basis for "the receiver". Those claims have been amended to address the issue noted in item 4 of the Office Action.

It is accordingly believed that the claims meet the requirements of 35 U.S.C. § 112, second paragraph.

In item 6 of the above-identified Office Action, claims 1 and 8 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U. S. Patent No. 5,432,821 to Polydoros et al ("POLYDOROS").

Applicants respectfully traverse the above rejection.

Applicants' claims require, among other limitations, determining a first estimated value for a replacement symbol occurring in a linear approximation in a CPFSK-modulated data signal. More particularly, Applicants' claim 1 recites, among other limitations:

**"determining a first estimated value for a replacement symbol, occurring in a linear approximation of the CPFSK, with reference to an n-1th time step, and**

**taking the first estimated value into account in a calculation of the transition metric value." [emphasis added by Applicants]**

Similarly, independent claim 8 recites, among other limitations:

**"estimating means for determining a first estimated value for a replacement symbol, occurring in a linear approximation of a CPFSK, with reference to an n-1th time step, said estimating means being connected to said calculating unit for communicating the first estimated value to said calculating unit." [emphasis added by Applicants]**

In the instant application, the **estimated replace symbol** relates to a **transmitter state**. This is supported on page 11 of the instant application, which states:

"An important aspect of the invention consists in using a first estimated value for the placement symbol occurring in the preceding time step  $n-1$  during the linear approximation of the CPFSK in order to calculate the transition metric value for a transition between the time steps  $n$  and  $n+1$ . Thus, in the time step  $n$  the state of the transmitter in the time step  $n-1$  is estimated and the calculation of the reconstructed signal value is carried out on the basis of this estimated transmitter state. This mode of procedure according to the invention is also denoted below as TST (Transmitter State Tracking). Since **the transmitter state** (lying one time step back) (**that is to say the appropriate replacement symbol**) is estimated, the presence of a finite modulation alphabet is not required. For a method according to the invention is therefore also suitable for using irrational modulation indices." [emphasis added by Applicants]

See also, page 12 of the instant application, lines 9 - 21. Similarly, page 30 of the instant application, lines 5- 11, states:

"The TST demodulation according to the invention of a CPFSK signal is not based on any prescribed replacement symbol modulation alphabet, but **a replacement symbol (transmitter state)** one time step back (the  $(n-1)$ th one) occurring during the modulation is **estimated** at the receiver end in the subsequent  $(n)$ th time step. The transmitter state is "corrected" in the receiver." [emphasis added by Applicants]

Thus the **estimated replacement symbol** of Applicants' claims is really an **estimated transmitter state**.

The POLYDOROS reference neither teaches, nor suggests, "determining a first estimated value for a replacement symbol", as required by Applicants' claims. Rather, POLYDOROS discloses a system and method for estimating data sequences in digital transmissions including a memory for storing a plurality of "surviving" sequences. For each stored "survivor" in POLYDOROS, the system includes a channel estimator and a metrics computer, which calculates a measure of the likelihood of the survivor as a function of the survivor itself, the observed input, and the parameters of the associated channel estimator. See POLYDOROS, Abstract. On page 3 of the Office Action, item 7, it is stated:

"Consider claims 1 and 8 as claimed. Polydoros discloses a method and device for estimating a sequence of input data symbols comprising: a device configured to carry out ACS operation (208, 210, 212); a calculating unit for calculating a transition metric value (204); and an estimating means for determining a first estimated value; the estimating means being connected to the calculating unit for communicating the first estimated value to the calculating unit. (See fig. 14, col. 24, lines 35 - 53)."

The cited portion of the Office Action points to the **channel estimators** of POLYDOROS as allegedly disclosing Applicants' claimed **estimation of a replacement symbol**. More particularly, col. 24 of POLYDOROS, lines 35 - 53, states:

"FIG. 14 is a block diagram that illustrates the PSP system according to the invention. As in the conventional system, the system according to the invention includes a survivor memory block 206, an

accumulated metrics computation block 208, a survivor selection block 210, and a best survivor selection block 212, which generates an estimated encoding sequence  $\hat{a}_{k-d}$ . According to the invention, however, instead of a single channel estimator 102 (see FIG. 13), **a separate channel estimator 202<sub>1</sub>, . . . , 202<sub>N</sub> is provided for each survivor s<sub>1</sub>, . . . , s<sub>N</sub>. A corresponding separate metrics computation block 204<sub>1</sub>, . . . , 204<sub>N</sub> is preferably also provided for each survivor, whereby metrics computation block i will compute all transition metrics for survivor i at time k to each state at time k+1, that is, s<sub>i,1</sub>, . . . , s<sub>i,N</sub>, in the manner described above. The channel estimators 202<sub>1</sub>, . . . , 202<sub>N</sub> compute estimates f<sub>k</sub>(s<sub>1</sub>), . . . , f<sub>k</sub>(s<sub>N</sub>) of the channel based on each individual survivor according to the method described above. "** [emphasis added by Applicants]

However, Applicants respectfully do not agree that the above cited portion of POLYDOROS teaches or suggests Applicants claimed estimated replacement symbol. Whereas, "survivor" channel estimates are calculated by the channel estimators in POLYDOROS, they are not the estimated replacement symbol (i.e., transmitter state) required by Applicants' claims. Rather, POLYDOROS discloses the estimation of unknown parameters during equalization. The estimation of unknown parameters in POLYDOROS is denoted as PSP (per-survivor-processing). Unknown parameters handled by PSP in POLYDOROS are the per-survivor channel estimates calculated in the channel estimator units 202<sub>1</sub> . . . 202<sub>N</sub>, **which are not replacement symbols (i.e. transmitter state descriptions) of CPFSK, that refer to the preceding time step n-1, used in trellis processing. The general explanation of the PSP scheme in POLYDOROS (see col. 8 of POLYDOROS, lines 17 - 66), fails**

to propose the usage of PSP for calculating a trellis state (i.e. fails to suggest handling the trellis states as unknown parameters). Therefore, Applicants believe that claims 1 and 8 of the instant application are patentable over the POLYDOROS reference.

In fact, the POLYDOROS reference teaches away from Applicants' claimed "determining a first estimated value for a replacement symbol, occurring in a linear approximation of the CPFSK".

Not only does POLYDOROS not teach or suggest determining estimated values for replacement symbols (i.e., transmitter states), as stated above, but POLYDOROS teaches using known state descriptions during equalization, contrary to Applicants' claimed invention. More particularly, as can be seen from equation (3) of POLYDOROS (col. 6 of POLYDOROS, lines 58 - 60), a state definition  $\mu_k$  is used in the trellis diagram for ACS processing. However, the state definition  $\mu_k$  of POLYDOROS is treated as a known entity. POLYDOROS fails to teach or suggest that when executing an ACS operation with reference to a transition from time step  $n$  to time step  $n+1$ , a state of the transmitter (i.e., a replacement symbol) with reference to the  $n-1$ th time step is estimated. Quite to the contrary, and in accordance with conventional ACS processing, the state description  $\mu_k$  of POLYDOROS is, a-priori, known and

identical for each time step  $k$ , i.e., is not handled as an unknown parameter during equalization.

As such, it is believed that the POLYDOROS reference fails to teach or suggest, among other limitations of Applicants' claims, "determining a first estimated value for a replacement symbol, occurring in a linear approximation of the CPFSK", where the "replacement symbol" is a "transmitter state". It is additionally believed that the POLYDOROS reference specifically teaches away from Applicants' claimed invention by treating state description  $\mu_k$  as a known parameter during equalization.

It is accordingly believed that none of the references, whether taken alone or in any combination, teach or suggest the features of claims 1 and 8. Claims 1 and 8 are, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claims 1 or 8. As it is believed that the claims were patentable over the cited art in their original form, the claims have not been amended to overcome the references.

Finally, Applicants appreciatively acknowledge the Examiner's statement that claims 2 - 7 and 9 - 13 "would be allowable if



rewritten in independent form including all of the limitations of the base claim and any intervening claims." In light of the above, Applicants respectfully believe that the rewriting of claims 2 - 7 and 9 - 13, is unnecessary at this time.

In view of the foregoing, reconsideration and allowance of claims 1 - 13 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out.

Additionally, please consider the present as a petition for a one month extension of time, and please provide a one month extension of time, to and including, May 10, 2005 to respond to the present Office Action.

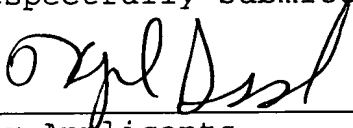
The extension fee for response within a period of one (1) month pursuant to Section 1.136(a) in the amount of \$120.00 in accordance with Section 1.17 is enclosed herewith.

Please provide any additional extensions of time that may be necessary and charge any other fees that might be due with

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Responsive to Office Action of January 10, 2005

respect to Sections 1.16 and 1.17 to the Deposit Account of  
Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,



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For Applicants

KPS:cgm

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